



WNT3 gene

Wnt family member 3

Normal Function

The *WNT3* gene is part of a large family of WNT genes, which play critical roles in development before birth. WNT genes provide instructions for making proteins that participate in chemical signaling pathways in the body. These pathways control the activity of certain genes and regulate the interactions between cells during embryonic development.

Research in animals indicates that the protein produced from the *WNT3* gene is critical for the outgrowth of the limbs in the developing embryo. The WNT3 protein also appears to play an important role in determining the anterior-posterior axis (the imaginary line that runs from head to tail in animals) during the earliest stages of embryonic development. Additionally, the effects of mutations in the human *WNT3* gene suggest that the protein may be involved in the normal formation of the facial features, head, heart, lungs, nervous system, skeleton, and genitalia.

Health Conditions Related to Genetic Changes

tetra-amelia syndrome

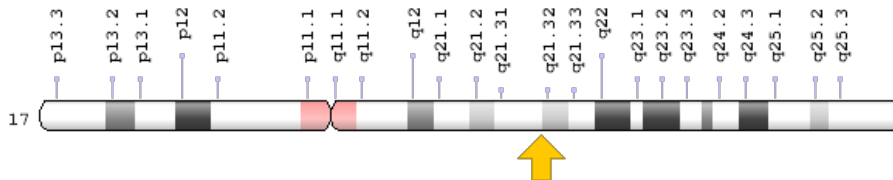
A mutation in the *WNT3* gene has been shown to cause tetra-amelia syndrome among members of one large family from Turkey. This mutation, which occurs in both copies of the *WNT3* gene in each cell, replaces one protein building block (amino acid) with a premature stop signal in the instructions for making the WNT3 protein. This mutation is written as Gln83Ter or Q83X.

Researchers believe that the Gln83Ter mutation results in the production of an abnormally short, nonfunctional version of the WNT3 protein. Loss of the WNT3 protein disrupts normal limb formation before birth and leads to the other serious birth defects associated with tetra-amelia syndrome.

Chromosomal Location

Cytogenetic Location: 17q21.31-q21.32, which is the long (q) arm of chromosome 17 between positions 21.31 and 21.32

Molecular Location: base pairs 46,762,506 to 46,818,760 on chromosome 17 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- INT4
- Oncogene INT4
- Proto-oncogene protein Wnt-3
- wingless-type MMTV integration site family member 3
- wingless-type MMTV integration site family, member 3
- WNT-3 proto-oncogene protein
- WNT3_HUMAN

Additional Information & Resources

Educational Resources

- Developmental Biology (sixth edition, 2000): The Wnt Family
<https://www.ncbi.nlm.nih.gov/books/NBK10071/#A1044>

GeneReviews

- Tetra-Amelia Syndrome
<https://www.ncbi.nlm.nih.gov/books/NBK1276>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28WNT3%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1440+days%22%5Bdp%5D>

OMIM

- WINGLESS-TYPE MMTV INTEGRATION SITE FAMILY, MEMBER 3
<http://omim.org/entry/165330>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_WNT3.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=WNT3%5Bgene%5D>
- HGNC Gene Family: Endogenous ligands
<http://www.genenames.org/cgi-bin/genefamilies/set/542>
- HGNC Gene Family: Wnt family
<http://www.genenames.org/cgi-bin/genefamilies/set/360>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=12782
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/7473>
- UniProt
<http://www.uniprot.org/uniprot/P56703>

Sources for This Summary

- Barrow JR, Howell WD, Rule M, Hayashi S, Thomas KR, Capecchi MR, McMahon AP. Wnt3 signaling in the epiblast is required for proper orientation of the anteroposterior axis. *Dev Biol.* 2007 Dec 1;312(1):312-20. Epub 2007 Sep 26.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/18028899>
- Barrow JR, Thomas KR, Boussadia-Zahui O, Moore R, Kemler R, Capecchi MR, McMahon AP. Ectodermal Wnt3/beta-catenin signaling is required for the establishment and maintenance of the apical ectodermal ridge. *Genes Dev.* 2003 Feb 1;17(3):394-409.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/12569130>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC195987/>
- GeneReview: Tetra-Amelia Syndrome
<https://www.ncbi.nlm.nih.gov/books/NBK1276>

- Katoh M. Molecular cloning and characterization of human WNT3. *Int J Oncol*. 2001 Nov;19(5): 977-82.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/11604997>
- Liu P, Wakamiya M, Shea MJ, Albrecht U, Behringer RR, Bradley A. Requirement for Wnt3 in vertebrate axis formation. *Nat Genet*. 1999 Aug;22(4):361-5.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/10431240>
- Niemann S, Zhao C, Pascu F, Stahl U, Aulepp U, Niswander L, Weber JL, Müller U. Homozygous WNT3 mutation causes tetra-amelia in a large consanguineous family. *Am J Hum Genet*. 2004 Mar; 74(3):558-63. Epub 2004 Feb 5.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/14872406>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1182269/>
- Roelink H, Wang J, Black DM, Solomon E, Nusse R. Molecular cloning and chromosomal localization to 17q21 of the human WNT3 gene. *Genomics*. 1993 Sep;17(3):790-2.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/8244403>

Reprinted from Genetics Home Reference:
<https://ghr.nlm.nih.gov/gene/WNT3>

Reviewed: February 2008
Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services